direct influence of Germany's greatest morphologist, Johannes Müller, and of Jacob Henle. The latter brought him to the study of the microscopic anatomy of the human body, and so started him upon the career of investigations, which, sixty-two years later, he is still pursuing. It is an interesting coincidence that Kölliker's career began in 1839, the very year in which Schwann established the cell doctrine for animals, so that he has lived through the whole period of the application of that doctrine to the problems of morphology, physiology and pathology, and has, during this epoch, achieved the remarkable distinction of having contributed more than any other single investigator to our knowledge of the cellular structure of animals. It is difficult to realize how many of the fundamental facts of microscopic anatomy, even of those which have been taught in elementary text-books for forty or fifty years, we owe to the discoveries of Kölliker.

In 1841, he became assistant to Henle, who was then at Zürich. In 1844 he was promoted to be professor extraordinarius of physiology. The conditions at Zürich were unsatisfactory, so that in 1847 he accepted a call to Würzburg, where he has since remained, for over half a century. In 1848 he married Maria Schwarz, of Mellingen, in Switzerland.

The volume gives a list of the celebrations in which the author took part, and a list also of all the medals, prizes and other honors which have been bestowed upon him. There are also accounts of his journeys, several of which took him to the sea-shore for purposes of research. The accounts are chiefly in the form of letters, written at the time, and they include a great number of interesting impressions of famous scientific men which offer valuable material for the history of science during the century.

There are three portraits of the author—that which forms the frontispiece is an admirable likeness of the handsome and intellectual face. Another full-page illustration is a photograph of the carved box which was made for the congratulatory address presented to Kölliker on his eightieth birthday.

The second part of the work enumerates his activities as a university teacher and administrator, including the various courses of lectures he has delivered. Next follows the annotated catalogue of his publications, classified with considerable care. The annotations are often explanatory of the origin and purposes of the separate publications and of the standpoint of the author at the time. Other notes define the share of an essay in developing and fixing scientific conclusions. Finally one encounters, apropos of several articles in the catalogue, additional new observations recorded, which serve to correct and amplify the original record. Some of these observations are illustrated by new figures also. In brief, there is scientific matter included, which is here published for the first time.

Kölliker's 'Erinnerungen' is different in many respects from the usual autobiography, but is certainly a remarkable contribution to the record of the general condition and progress of science during the second half of last century.

Charles S. Minot.

The Bird Book. By Fannie Hardy Eckstorm. Boston: D. C. Heath & Co. 1901. 12mo. Pp. xii + 276; 24 pls., map, and 31 figs. in text.

The Woodpeckers. By Fannie Hardy Eckstorm. With Illustrations. Boston and New York: Houghton, Mifflin & Co. 1901. 12mo., pp. viii + 132; 5 col. pls., 21 figs. in text.

The time was, not many decades ago, when the young student of ornithology was, of necessity, self-taught, learning almost wholly by his own unaided observation in the field. Nowadays the demands of a multitude of would-be learners for short and easy paths to knowledge have led to the making of many books, that serve, at least, to show how hard it is for books alone to give the beginner the training he needs. How to observe carefully and thoroughly, and how to interpret what one sees, are not readily learned, except by the hard school of experience.

In these two volumes Mrs. Eckstorm has to a remarkable degree succeeded, where some of her predecessors have failed, and surely has gone far toward accomplishing the seemingly impossible. Even abstruse technicalities and fundamental biological principles are stated so clearly and simply that a child easily may com-

prehend them; and the details of bird life are so told that the reader cannot fail to gain an idea of what things the experienced naturalist looks for, and what he sees.

'The Bird Book' is divided into four parts. A dozen or so descriptive sketches under the title 'Water-birds in their Homes,' are followed by explanations of such matters as the structure, mechanism and use of birds' feet, wings and bills, and the adaptation of their different forms to habits. Then other, more philosophical subjects are unfolded, and made surprisingly plain, such as the principles of classification, the conditions of the struggle for existence, distribution and migration; and the concluding chapters are devoted to detailed accounts of some habits of birds, as 'How the Hawk Eats his Food,' 'The Cave Swallow's Changes in Nest-building,' 'How the Shrike Hunts.'

'The Woodpeckers' is, in form, more a popular monograph of that group of birds. After several chapters on the habits of woodpeckers in general, five widely distributed and representative North American species are taken up in turn, and the characteristics of each discussed. Following this, the peculiarities and uses of the woodpecker's bill, foot, tail and tongue are studied, and then attention is drawn to the modifications of these organs in different genera and to their remarkable adaptation to the specialized habits of each. The volume is concluded by a key for the identification of all the North American woodpeckers.

The books are well written. The style is never dull, and often brilliant. They are abundantly and, on the whole, well, illustrated; and 'The Woodpeckers,' in addition to various figures in the text, contains five colored plates.

It should be added that throughout both volumes the author is remarkably successful in carrying out their evident underlying purpose —not merely to convey information and inspire interest, but to cultivate in the beginner, by example rather than precept, a truly scientific spirit, both in his observations and in his deductions. C. F. B.

Engineering Chemistry, a Manual of Quantitative Chemical Analysis for the Use of Students, Chemists and Engineers. By THOMAS B. STILLMAN. Second edition. Easton, Pa., The Chemical Publishing Co. Pp. 22 + 503. Price, $4.50.

The first edition of this book appeared in 1897. Its usefulness is indicated by the fact that a second edition is required so soon. The work seems to be designed to serve several purposes. The first portion, especially, appears to be intended for the use of students beginning the subject of quantitative analysis. The exercises selected in this portion are satisfactory, but the directions lack that careful detail in regard to methods of manipulation and in regard to the properties of the compounds used in analysis, which are so necessary for the student who is to acquire any adequate knowledge of the subject. It may be objected, of course, that room could not be found in this book for such details. It would seem, however, that these exercises at the beginning should have been omitted altogether or they should have been properly given.

The chemist or student who has already acquired a knowledge of analytical methods will find very much throughout the book that will prove very useful. The subjects discussed cover a wide range, the more important being the analysis and filtration of water, the analysis of coal, gas and other fuels, calorimetry, iron and steel analysis, blast furnace charges, analysis and tests of cements, analysis of clay, alloys, paper, soap, oils, paints and asphalt, pyrometry, electrical units and energy equivalents.

The writer is well aware of the large amount of labor which an author must give to the study of the literature of each topic in writing a book of this kind, in order to determine what is the best present analytical practice, and some mistakes are to be expected. In several cases, however, it would seem that better methods or more accurate directions might have been easily found. Thus, under coal analysis, in giving Eschka's method for sulphur, nothing is said about the danger of absorption of sulphur from an ordinary gas flame; for phosphorus in steel the method of Dudley and Pease is given, although that method has since been modified in several important particulars, and made more accurate without increasing the time required for its execution; for total carbon in iron, solu-